



Implications of global change for the maintenance of water quality and ecological integrity in the context of current water laws and environmental policies

Author(s): Hamilton AT, Barbour MT, Bierwagen BG
Year: 2010
Journal: Hydrobiologia. 657 (1): 263-278

Abstract:

There is both a fundamental and applied need to define expectations of changes in aquatic ecosystems due to global changes. It is clear that programs using biological indicators and reference-based comparisons as the foundation for assessments are likely to make increasingly erroneous decisions if the impacts of global change are ignored. Global changes influence all aspects of water resource management decisions based on comparisons to reference conditions with impacts making it increasingly problematic to find an "undisturbed" water body to define acceptable conditions of ecological integrity. Using a more objective scale for characterizing reference conditions that is anchored in expectations for what would be attainable under undisturbed conditions, such as the Biological Condition Gradient (BCG) is one approach that maintains consistent definitions for ecosystem conditions. In addition, protection of reference stations and of unique or undisturbed aquatic resources is imperative, though the scope of protection options is limited. Projections indicate that encroaching land use will affect 36-48% of current reference surface waters by the year 2100. The interpretation of biological indicators is also at risk from global changes. Distinguishing taxonomic attributes based on temperature or hydrologic preferences can be used to enhance the ability to make inferences about global change effects compared to other stressors. Difficulties arise in categorizing unique indicators of global changes, because of similarities in some of the temperature and hydrologic effects resulting from climate change, land use changes, and water removal. In the quest for biological indicators that might be uniquely sensitive to one global stressor as an aid in recognizing probable causes of ecosystem damage, the potential similarities in indicator responses among global and landscape-scale changes needs to be recognized as a limiting factor. Many aspects of global changes are not tractable at the local to regional scales at which water quality regulations are typically managed. Our ability to implement water policies through bioassessment will require a shift in the scale of assessment, planning, and adaptations in order to fulfill our ultimate regulatory goals of preserving good water quality and ecological integrity. Providing clear expectations of effects due to global change for key species and communities in freshwater ecosystems will help water quality programs achieve their goals under changing environmental conditions.

Source: <http://dx.doi.org/10.1007/s10750-010-0316-6>

Resource Description

Climate Scenario :

specification of climate scenario (set of assumptions about future states related to climate)

Climate Change and Human Health Literature Portal

Special Report on Emissions Scenarios (SRES)

Special Report on Emissions Scenarios (SRES) Scenario: SRES A2, SRES B1

Communication: ☒

resource focus on research or methods on how to communicate or frame issues on climate change;
surveys of attitudes, knowledge, beliefs about climate change

A focus of content

Communication Audience: ☒

audience to whom the resource is directed

Policymaker

Early Warning System: ☒

resource focus on systems used to warn populations of high temperatures, extreme weather, or other elements of climate change to prevent harm to health

A focus of content

Exposure : ☒

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Food/Water Quality

Geographic Feature: ☒

resource focuses on specific type of geography

Freshwater

Geographic Location: ☒

resource focuses on specific location

Global or Unspecified

Health Impact: ☒

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Mitigation/Adaptation: ☒

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology: ☒

type of model used or methodology development is a focus of resource

Exposure Change Prediction

Resource Type: ☒

Climate Change and Human Health Literature Portal

format or standard characteristic of resource

Review

Timescale: ☐

time period studied

Long-Term (>50 years)

Vulnerability/Impact Assessment: ☐

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content